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NTE999−1
Integrated Circuit
Programmable Voltage Reference
TO92 Type Package

Description:

The NTE999−1 is a programmable shunt voltage reference in a TO92 type package with guaranteed temperature stability over the entire operating temperature range. The output voltage may be set to any value between 2.5V and 36V with two external resistors.

The NTE999−1 operated with a wide current range from 1 to 100mA wit a typical dynamic impedance of 0.2± .

Features:

- Adjustable Output Voltage: V_{REF} to 36V
- Sink Current capability: 1 to 100mA
- Typical Output Impedance: 0.22±
- 0.4% Voltage Precision

Absolute Maximum Ratings:

Cathode−to−Anode Voltage, V_{KA} 37V
Continuous Cathode Current Range, I_k . . . . −100 to +150mA
Reference Input Current Range, I_{ref} . . . . −0.05 to +10mA
Power Dissipation (Note 1), P_d 625mW
Operating Junction Temperature, T_J . . . . +150°C
Storage Temperature Range, T_{stg} . . . . −65° to +150°C
Electrostatic Discharge, ESD
  HBM: Human Body Model (Note 2) 2000V
  MM: Machine Model (Note 3) 200V
  CDM: Charged Device Model (Note 4) 1500V
Thermal Resistance, Junction−to−Ambient, R_{thJA} . . . . +130°C/W

Note 1. Calculated with T_J = +150°C, T_A = +25°C, and with R_{thJA} = 200°C/W.

Note 2. Human body model: A 100pF capacitor is charged to the specified voltage, then discharged through a 1.5k± resistor between tow pins of the device. This is done for all couples of connected pin combinations while the other pins are floating.

Note 3. Machine model: A 200pF capacitor is charged to the specified voltage, then discharged directly between two pins of the device with no external series resistor (internal resistor < 5±). This is done for all couples of connected pin combinations while the other pins are floating.

Note 4. Charged device model: All pins and the package are charged together to the specified voltage and then discharged directly to the ground through only one pin. This is done for all pins.

Recommended Operating Conditions:

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Cathode−to−Anode Voltage	V_{KA}		V_{ref}	–	36	V
Cathode Current	I_k		1	–	100	mA
Operating Ambient Temperature Range	T_{opr}		−20	–	+70	°C

Electrical Characteristics: (T_A = +25°C unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Reference Input Voltage	V_{ref}	$V_{KA} = V_{ref}$, I_k = 10mA		2.49	2.50	2.51	V
Reference Input Voltage Deviation Over Temperature Range	ΔV_{ref}	$V_{KA} = V_{ref}$, I_k = 10mA, $T_{min} \leq T_A \leq T_{max}$, Note 5		–	3	20	mV
Temperature Coefficient of Reference Input Voltage	$\frac{\Delta V_{ref}}{\Delta T}$	$V_{KA} = V_{ref}$, I_k = 10mA, $T_{min} \leq T_A \leq T_{max}$, Note 6		–	±13	±90	ppm/°C
Ratio of Change in Reference Input Voltage to Change in Cathode−to−Anode Voltage	$\frac{\Delta V_{ref}}{\Delta V_{ka}}$	I_k = 10mA, ΔV_{KA} = 36V to 3V		−2.0	−1.1	–	mV/V
Reference Input Current	I_{ref}	I_k = 10mA, R1 = 10k± , R2 = ∞		–	1.5	2.5	≤A
			$T_{min} \leq T_A \leq T_{max}$	–	–	3.0	≤A
Reference Input Current Deviation over Temperature Range	ΔI_{ref}	I_k = 10mA, R1 = 10k± , R2 = ∞, $T_{min} \leq T_A \leq T_{max}$		–	0.2	1.2	≤A
Minimum Cathode Current for Regulation	I_{min}	$V_{KA} = V_{ref}$		–	0.5	1.0	mA
Off−State Cathode Current	I_{off}			–	180	500	nA
Dynamic Impedance	$\|Z_{KA}\|$	$V_{KA} = V_{ref}$, ΔI_k = 1 to 100mA, f ≤ 1kHz, Note 7		–	0.2	0.5	±

Note 5. ΔV_{ref} is defined as the difference between the maximum and minimum values obtained over the full temperature range, $\Delta V_{ref} = V_{ref}max - V_{ref}min$.

Note 6. The temperature coefficient is defined as the slopes (positive and negative) of the voltage versus temperature limits within which the reference is guaranteed.

Note 7. The dynamic impedance is defined as $|Z_{KA}| = \frac{\Delta V_K}{\Delta I_K}$